Research Report
KTC-94-21

EVALUATION OF EDGE DRAINS HEADWALLS AND OUTLETS ON WESTERN KENTUCKY PARKWAY AND PENNYRILE PARKWAY

by

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September 1994

EXECUTIVE SUMMARY

Longitudinal, round, perforated pipe edge drains have been used along Kentucky roadways for approximately two decades. Most of these edge drains were installed on the Interstate and Parkway systems.

Several problems related to the drains have been noted in the last seven years. A number of these problems have been observed to be related to flexible outlet pipes and headwalls.

In 1989, the single wall flexible polyethylene outlet pipe was replaced by double wall polyethylene pipe.

This report documents findings of the investigation of 413 edge drain outlets on the Western Kentucky Parkway and Pennyrile Parkway. Of the 413 outlets investigated, approximately 74 outlets were not installed properly or were damaged during construction. A majority of the outlets inspected had single-wall polyethylene pipe precast into the headwall and approximately a 1-to 2-foot pigtail for connecting to the double wall. More problems were observed at the location of the headwall and outlet pipe connection than any other point in the drainage system.

It was concluded from this research that rigid outlet pipe should be precast into the headwalls. This should help eliminate problems occurring at the headwall connection.

Edge drains and outlets should be inspected with a pipeline inspection camera after they are installed.

Significant problems have been observed with the headwalls settling in the rear over time allowing debris to accumulate in the trough.

It appears that a maintenance program should be established to clean the troughs of the headwalls and to check the screens for clogging and rust.

Positive flow should also be maintained from the headwalls. The buildup of grass and silt can eventually impede the flow. Headwalls located in cuts are more prone to become covered or ponded.

It appears that the No. 2 stone currently being placed around the outlet is helping to reduce vegetation and debris from collecting in the troughs of the headwalls.

Introduction

On May 10, 1994, the Kentucky Transportation Center conducted a routine edge drain and outlet inspection on the Pennyrile Parkway in the vicinity of Milepost 23. The edge drains had been in service since 1992. Two edge drain outlets were inspected with a "Cues" pipeline inspection camera. One of the outlets was 85 percent blocked by rock and debris. District 2, operations personnel concerned with the findings requested that the Kentucky Transportation Center evaluate all 364 outlets on the project plus an additional 49 edge drain outlets that were being installed on the Western Kentucky Parkway.

This report documents the video inspection of edge drain outlet pipes on the Pennyrile Parkway and Western Kentucky Parkway. Included on the Western Kentucky Parkway was the evaluation of the 4-inch round pipe edge drains. The inspection was conducted in May and June of 1994. Of the 413 outlets investigated, 74 outlets were severely damaged and 34 were moderately damaged. Included with this report is an eight-minute video tape summarizing several of the problems encountered during the inspection. (The video tape summarizes the performance of 405 outlets, 8 additional outlets have been inspected since the production of the video).

Edge Drain Headwall and Outlet Pipe Condition Survey

Debris Accumulation in Headwalls

A total of 49 headwalls and outlets were inspected on Western Kentucky Parkway. Of the 49 headwalls inspected, 98 percent were clean (no debris in the trough of the headwall), and two percent were partially covered (outlet was partially visible). The edge drains were inspected shortly after construction . A total of

364 headwalls and outlets were inspected on the Pennyrile Parkway. Of the 364 headwalls, 83.0 percent were clean, 15.8 percent were partially covered, 0.9 percent were covered, and 0.3 percent were plugged. Statistical information on headwall conditions is contained in Table 1 (A detailed statistical summary and the field data base are contained in Appendix A for Western Kentucky Parkway and in Appendix B for Pennyrile Parkway).

Table 1. Headwall Conditions

LOCATION->	WESTERN KY PARKWAY	PENNYRILE PARKWAY
% CLEAN	97.96	82.96
% PARTIALLY COVERED	2.04	15.76
% COVERED	0.0	0.96
% PLUGGED	0.0	0.32

Condition of Rodent Screens

The rodent screens were visually inspected for signs of clogging. The averages for Western Kentucky Parkway and Pennyrile Parkway combined were: 21 percent of the headwalls did not have screens, 66 percent of the screens were open, 12 percent were partially blocked, 1 percent were blocked (Table 2).

Table 2. Screen Condition

LOCATION->	WESTERN KY PARKWAY	PENNYRILE PARKWAY	AVERAGE
% MISSING	20.4	22.0	21.2
% OPEN	71.4	61.0	66.2
% PARTIALLY OPEN	8.2	15.6	11.9
% BLOCK	0.0	1.4	0.7

Signs of Siltation

The headwalls were inspected for signs of siltation. Most of the drains and headwalls were relatively free of silt. There was some buildup of calcium carbonate in the corrugations which appeared to have broken loose and had become lodged behind the screen. Table 3 indicates 87 percent of the headwalls had no signs of siltation.

Table 3. Siltation at Headwall

LOCATION->	WESTERN KY PARKWAY	PENNYRILE PARKWAY	AVERAGE
% NONE	89.80	84.89	87.3
% SLIGHT	10.20	10.71	10.5
% MODERATE	0.0	3.57	1.8
% SEVERE	0.0	0.82	0.4

Signs of Flow and Positive Drainage

Each outlet was inspected for signs of flow and to determine if positive drainage had been provided. On the average for both routes, 31 percent of the headwalls showed flow at the time of the inspection and 71 percent of the headwalls had been provided with a proper grade to drain water away from the headwalls. Approximately 17.6 percent of the outlets were not properly drained (Table 4). It appeared that a minimum of six inches of free board below the trough of the headwall had not been provided in several locations.

Table 4. Summary of Headwalls that were Flowing and Those with Positive Drainage

LOCATION	WESTERN KY PARKWAY	PENNYRILE PARKWAY	AVERAGE
INDICATIONS OF FLOW %	36.7	26.1	31.4
POSITIVE DRAINAGE FROM HEADWALL %	79.6	63.2	71.4

Condition of Outlet Pipes

The pipes were inspected for sags, siltation, standing water, compression, rips, and other noticeable distress. The assigned outlet pipe sections are shown in Drawing's 1 through 3. Approximately 18 percent of the outlet pipes that were inspected were less than 50 percent open. On the Western Kentucky Parkway, "T" connectors were modified to four-way connectors by cutting and splicing an additional pipe into the top of the "T". In several cases, the additional pipe was pushed too far into the coupling thereby blocking the outlet end of the "T".

Significant pipe distress observed during the inspection of the outlets and mainlines is shown in Table 5. Distress information in the table includes:

1) Compressed pipe or coupling
2) Backfill in pipe
3) Séparation at coupling
4) Rip in pipe
5) Block outlet at "T"

The distress information is listed in percentages for each of the assigned outlet pipe sections. Table 5 indicates for the Western Kentucky Parkway more significant problems occurred at A, E, and F (Drawing No. 1). More significant problems occurred on Pennyrile Parkway at A directly behind the headwall. It appears that location A is the location that continues to experience most of the problems (which is located on the backside of the headwall). In most cases, a single wall flexible pipe had been precast into the headwalls leaving a short "pigtail" to allow for connection of the double- wall outlet pipe.

TABLE 5. Percent Outlet Pipe and Mainline Showing Distress

LOCATION OF DISTRESS IN OUTLET OR MAINLINE	WESTERN KY PARKWAY (% DISTRESSED)	PENNYRILE PARKWAY (% DISTRESSED)
A	16.32	32.68
B	0.00	9.44
C	2.04	0.73
D	0.00	0.24
E	16.32	1.45
F	14.28	---
G	4.08	---
H	0.00	---

Conclusions and Recommendations

Approximately 20 percent of the edge drain outlets inspected had been damaged during installation and/or not installed properly. More significant problems were observed at the headwall and outlet pipe connection than any other location in the drainage system.

It appears that all edge drains and outlets should be inspected with a mini camera after installation.

Rigid outlet pipe should be precast into the headwalls. This should help eliminate problems occurring at the headwall connection.

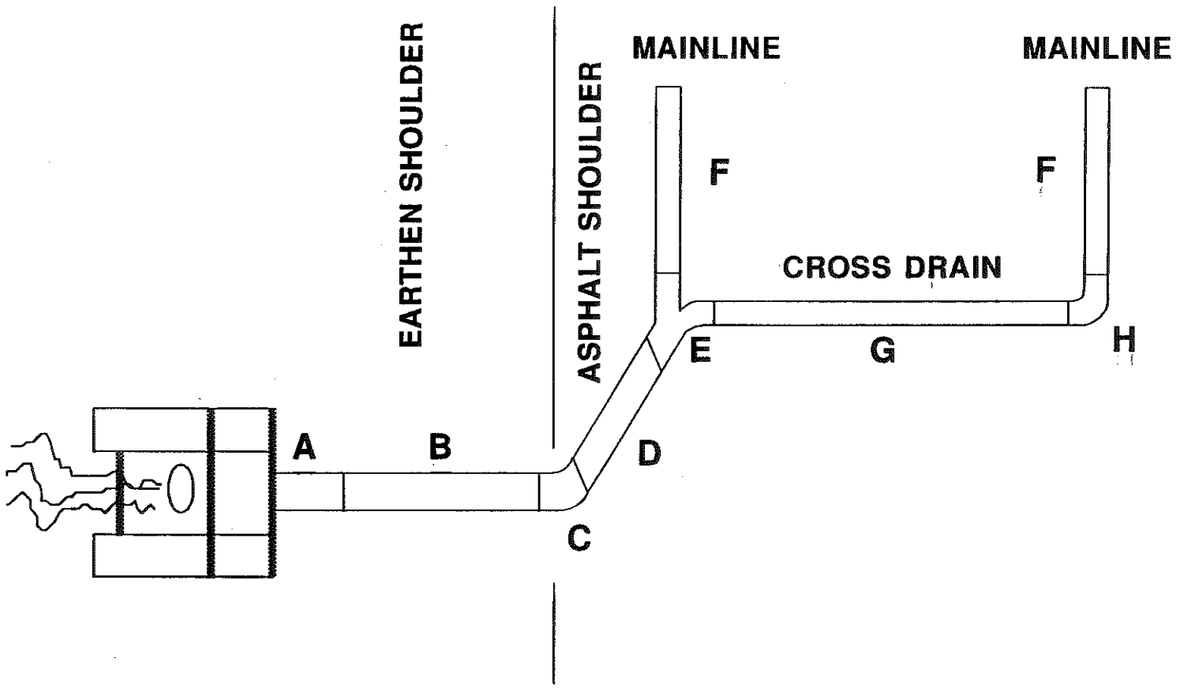
Sagging of the double wall polyethylene pipe was apparent in several of the outlets. The trench bottom needs to be better prepared prior to placing the pipe. Consideration should be given to using a more rigid pipe.

In addition, in several areas on the Pennyrile Parkway, it appeared that a 45 degree vertical elbow had been placed behind the headwall. The elbow decreased the drop in the outlet pipe by several inches. This is not recommended.

Maintenance program should be established to clean the troughs of the headwalls and to check the screens for clogging. It appears the No. 2 stone being placed around the headwall is helping to reduce debris from accumulating in the trough of the headwall, and should reduce maintenance costs.

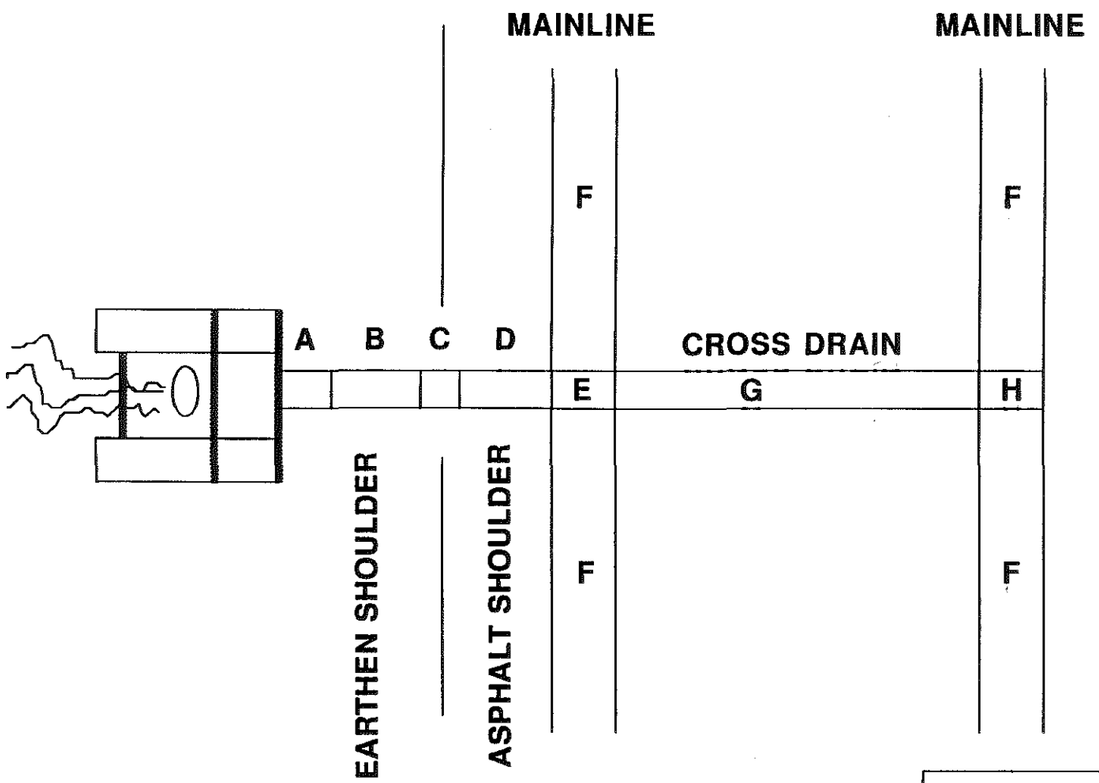
Positive flow should also be maintained from the headwalls. The buildup of grass and silt can eventually impede some of the flow. Headwalls located in cuts are more prone to becoming covered or ponded.

ASSIGNED OUTLET PIPE SECTIONS



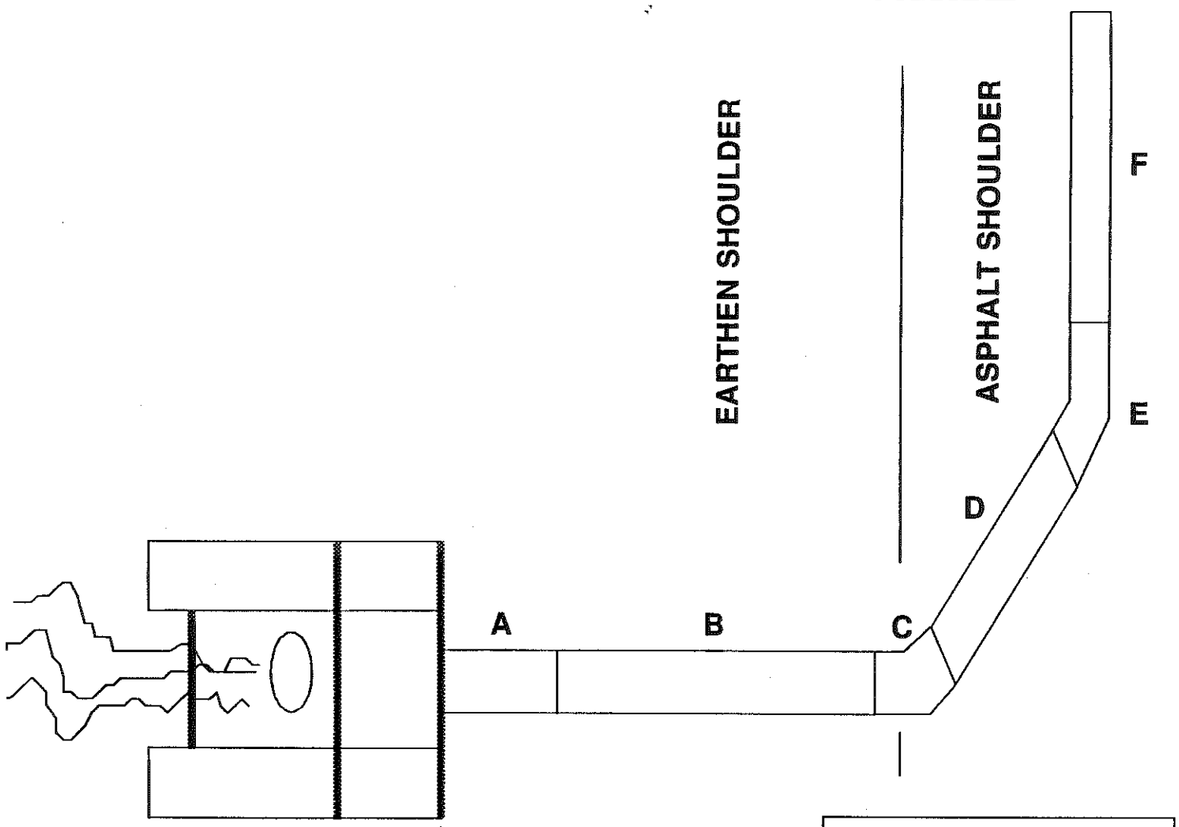
DRAWING NO. 1

ASSIGNED OUTLET PIPE SECTIONS



DRAWING NO. 2

ASSIGNED OUTLET PIPE SECTIONS



DRAWING NO. 3

APPENDIX A

SUMMARY OF WESTERN KENTUCKY PARKWAY

WESTERN KENTUCKY PARKWAY
CONDITION OF HEADWALL

DRAINAGE FROM HEADWALL

	NUMBER	PERCENT
GOOD	39	79.59
FAIR	5	10.20
POOR	5	10.20

FLOW

	NUMBER	PERCENT
FLOW	18	36.73
NO FLOW	31	63.27

SILT

	NUMBER	PERCENT
NONE	44	89.80
SLIGHT	5	10.20

SCREEN

	NUMBER	PERCENT
NONE	10	20.41
OPEN	35	71.43
PT. OPEN	4	8.16

OUTLET PIPE AT HEADWALL

	NUMBER	PERCENT	
CLEAN	48	97.96	
PT. COVER	1	2.04	GRAVEL AND DIRT

OVERALL CONDITION OF OUTLET AND/OR EDGE DRAIN

	NUMBER	PERCENT
NEED REPAIR	9	18.37
QUESTIONABLE	2	4.08
GOOD	38	77.55
TOTAL	49	100

WESTERN KENTUCKY PARKWAY

TYPE OF DISTRESS OBSERVED (NUMBER)

LOCATION	A	B	C	D	E	F	G	H
SAG	3							
SAG WITH STANDING WATER	4	3	1	4		7	8	1
SAG WITH SILTATION		2		1		2	1	
COMPRESSED COUPLING	3							
COMPRESSED PIPE	4				1	1		
BACKFILL IN PIPE			1		1	3		
SEPARATION AT COUPLING					1	2	1	
RIP IN PIPE	1					1	1	
PIPE TWISTED	1							
BLOCKED BY MAINLINE AT "T"					5			
DEBRIS			1					
TOTAL	16	5	3	5	8	16	11	1

TYPE OF DISTRESS OBSERVED (PERCENT)

LOCATION	A	B	C	D	E	F	G	H
SAG	6.12	--	--	--	--	--	--	--
SAG WITH STANDING WATER	8.16	6.12	2.04	8.16	--	14.29	16.33	2.04
SAG WITH SILTATION	--	4.08	--	2.04	--	4.08	2.04	--
COMPRESSED COUPLING	6.12	--	--	--	--	--	--	--
COMPRESSED PIPE	8.16	--	--	--	2.04	2.04	--	--
BACKFILL IN PIPE	--	--	2.04	--	2.04	6.12	--	--
SEPARATION AT COUPLING	--	--	--	--	2.04	4.08	2.04	--
RIP IN PIPE	2.04	--	--	--	--	2.04	2.04	--
PIPE TWISTED	2.04	--	--	--	--	--	--	--
BLOCKED BY MAINLINE AT "T"	--	--	--	--	10.20	--	--	--
DEBRIS	--	--	2.04	--	--	--	--	--
TOTAL	32.65	10.20	6.12	10.20	16.33	32.65	22.45	2.04

EDGE DRAIN PIPES AND OUTLET PIPES ON THE WESTERN KENTUCKY PARKWAY

			HEADWALL CONDITION								OUTLET PIPE CONDITION										
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	Outlet Schematic (DRAWING NO.)	A	B	C	D	E	F	G	H	Good (1) Questionable (2) Bad (3)	Distance	Comments
4703+00	W	1	1		2	1	2	1	12	3		2							3	22	Buckle in pipe. Can't get past with camera, 40% crushed
4773+00	W	1	1		2	1	2	1	12	1	4								3		Pipe crushed behind headwall
4788+00	W	1	1		2	1	2	1	12	2	8				10				3	15	2 punctures at back of headwall, then blocked by mainline at 15'
4785+50	W	1	1		2	1	1	1	12	2					10				3		Blocked by mainline
4790+50	W	1	1		2	1	2	1	12	2	2	2			10				3	15	Mainline cut into pipe at 15' blocking it
4798+00	W	1	1		2	1	2	1	12	1					567				3		Cd connector crushed and one third full of rock and debris
4795+50	W	1	1		2	1	1	1	12	2					10				3	15	Mainline cut into pipe at 15' blocking it
4803+00	W	1	1		2	1	2	1	12	1						78	78		3	17	Mainline: can't get camera past. Cd: can't get camera past
4807+00	W	1	1		2	1	1	1	12	2	1				10				3	18	16' into the pipe, a hole has been cut and the mainline is stuck into it, blocking the outlet
4715+50	W	1	1		2	1	2	1	12	3						5			2	65	Pipe is approx 35 to 40% compressed. Slight buckling on top, at 65' from outlet
4812+00	W	1	1		2	1	1	1	12	1	45					67 or 68	2		2	55	Rock and mud in mainline 55' from headwall
4699+00	W	1	2	12	2	1	2	12	12	1				2					1	70	
4700+00	W	1	1		2	1	2	2	12	1									1		Y connector at 17' into cd, no problems.
4705+00	W	1	1		2	1	2	1	12	1									1		
4710+00	W	1	1		2	1	2	2	12	1							2		1		Cd, sag just past Y connector.
4707+50	W	1	1		2	1	2	2	12	3						2			1		No Cd
4712+00	W	1	1		2	1	2	2	12	3						2			1		Slight sag at start of mainline
4718+50	W	1	1		2	1	2	12	12	1							2		1		Sag behind Y connector at 17'
4720+50	W	1	1		2	1	2	12	12	3									1		No Cd connection. No problems.
4725+50	W	1	1		2	1	2	1	12	1									1		
4736+00	W	1	1		2	1	1	1	12	1	5					36			1	45	Cd sags with water just past connector, rocks at 45'.
4729+70	W	1	1		2	1	1	12	12	1			6				2		1	75	Cd, rocks in connector, sags (several) after connector
4733+50	W	1	1		2	1	2	1	12	2							2		1	40	Pushed 40' to tee on median side. T connector at 15' with pipe out into backside, no problem getting camera through
4744+00	W	1	1		2	1	1	1	12	1				3					1	82	Pushed 82' approx 35° up into the mainline of median. Can't get into outside main.
4740+50	W	1	1		2	1	2	1	12	1						26			1	70	Cd, several sags in Cd, rock in Cd at about 40'. No sign of hole or bad joint.
4750+00	W	1	1		2	1	1	12	12	1				2			2		1	80	Cd, 80' total. About 30' into center mainline. Can't get into outside main.
4755+50	W	1	1		1	1	1	2	12	1	1					2			1		Cd, went 5' in mainline center median. Could not get into outside mainline
4760+50	W	1	1		2	1	1	1	12	1	2								1		Y connector at 17', went into one side, couldn't get into other
4765+50	W	1	1		2	1	1	1	12	1		2					3		1		
4770+50	W	1	1		2	1	1	1	12	1		3				2			1		Y connector at 17', went into one side, can't get into other
4778+00	W	1	1		2	1	2	1	12	1	5					23			1	70	Y connector at about 17', went 70' down one side, couldn't get into other side
4775+50	W	1	1		2	1	1	1	12	1				2					1		Y connector at 17', went into one side, can't get into other
4780+50	W	1	1		3	2	2	1	12	1									1	70	Y connector at about 17', went 70' down one side, couldn't get into other side
4783+50	W	1	1		2	1	1	1	12	2	2			2				10	1		
4814+00	W	1	1		2	1	2	1	12	3	9								1	70	
4809+50	W	1	1		2	1	2	1	12	3	45								1		
4816+50	W	1	1		3	2	2	1	12	1	1					2	2	2	1		65 ft in mainline, 80 ft in Cd
4821+00	W	1	1		3	2	1	1	12	1							2		1		Y at 18', 80' in Cd, 65' in mainline
4818+50	W	1	1		3	2	1	1	12	3			2						1	100	Water standing from 27' to 95', up to half full
4823+00	W	1	1		2	1	1	1	12	3									1	75	Seemed to be no elbows or T's, straight shot into mainline looked good
4703+00	W	4	1		1	1	2	1	12	3									1	82	
4707+50	W	4	1		1	1	2	1	12	3									1	50	
4712+00	W	4	1		1	2	2	1	12	3		3							1	55	
4715+50	W	4	1		1	1	2	1	12	3									1	63	At 7', sock was showing.
4720+50	W	4	1		1	1	2	1	12	3			Debris						1	77	
4809+50	W	4	1		1	1	2	1	12	3	2								1	78	Water in pipe at 2'.
4814+00	W	4	1		1	1	1	1	12	3									1	86	
4818+50	W	4	1		1	1	2	1	12	2									1	22	"T" connector at 22', couldn't turn into mainline.
4823+00	W	4	1		1	1	2	1	12	3									1	63	

1. Shoulder headwall
2. Shoulder box
3. Median headwall
4. Median box

1. Clean
2. Partly covered
3. Covered
4. Plugged

1. Gravel
2. Dirt
3. Vegetation
4. Concrete

1. None
2. Open
3. Partly open
4. Blocked

1. None
2. Slight
3. Moderate
4. Severe

1. Yes
2. No

1. Good
2. Poor
12. Fair

1. Rigid
2. Flexible
12. System contains both 1 & 2

1. Sag
2. Sag with standing water
3. Sag with siltation
4. Compressed coupling
5. Compressed pipe
6. Backfill in pipe
7. Seperation at coupling
8. Rip in pipe
9. Pipe twisted
10. Mainline blocking outlet at modified "T"

* cd = Crossdrain

NOTE: Any numeric value, excluding distances and Stations, which has more than one digit means that more than one condition is applicable; i.e., for outlet pipe condition, a numeric value of 45 represents a compressed coupling and a compressed pipe.

APPENDIX B

SUMMARY OF PENNYRILE PARKWAY

PENNYRILE PARKWAY
CONDITION OF HEADWALL

DRAINAGE FROM HEADWALL

	NUMBER	PERCENT
GOOD	230	63.19
FAIR	43	11.81
POOR	91	25.00

FLOW

	NUMBER	PERCENT
FLOW	95	26.10
NO FLOW	269	73.90

SILT

	NUMBER	PERCENT
NONE	309	84.89
SLIGHT	39	10.71
MODERATE	13	3.57
SEVERE	3	0.82

SCREEN

	NUMBER	PERCENT
NONE	80	21.98
OPEN	222	60.99
PT. OPEN	57	15.66
BLOCKED	5	1.37

OUTLET PIPE AT HEADWALL

	NUMBER	PERCENT
CLEAN	258	82.96
PT. COVER	49	15.76
COVER	3	0.96
PLUGGED	1	0.32

OVERALL CONDITION OF OUTLET AND/OR EDGE DRAIN

	NUMBER	PERCENT
NEED REPAIR	65	17.86
QUESTIONABLE	32	8.79
GOOD	267	73.35
TOTAL	364	100

PENNYRILE PARKWAY

TYPE OF DISTRESS OBSERVED (NUMBER)

LOCATION	A	B	C	D	E	F
SAG	6	3				
SAG WITH STANDING WATER	46	24	12	54	13	5
SAG WITH SILTATION	2	1			1	1
COMPRESSED COUPLING	57	19	1		1	
COMPRESSED PIPE	14	5	1			
BACKFILL IN PIPE	33	8	1	1	3	
SEPARATION AT COUPLING	30	6			2	
RIP IN PIPE	1	1				
NEST		1	1	5	11	
STRAW		1			2	
DEBRIS		2				
TOTAL	189	71	16	60	33	6

TYPE OF DISTRESS OBSERVED (PERCENT)

LOCATION	A	B	C	D	E	F
SAG	1.65	0.82	--	--	--	--
SAG WITH STANDING WATER	12.64	6.59	3.30	14.84	3.57	1.37
SAG WITH SILTATION	0.55	0.27	--	--	0.27	0.27
COMPRESSED COUPLING	15.66	5.22	0.27	--	0.27	--
COMPRESSED PIPE	3.85	1.37	0.27	--	--	--
BACKFILL IN PIPE	9.07	2.20	0.27	0.27	0.82	--
SEPARATION AT COUPLING	8.24	1.65	--	--	0.55	--
RIP IN PIPE	0.27	0.27	--	--	--	--
NEST	--	0.27	0.27	1.37	3.02	--
STRAW	--	0.27	--	--	0.55	--
DEBRIS	--	0.55	--	--	--	--
TOTAL	51.92	19.51	4.40	16.48	9.07	1.65

A GUIDE TO INTERPRETING THE DATA

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

		HEADWALL CONDITION							OUTLET PIPE CONDITION									
Station	Direction	Location & Type of Headwall 1. Shoulder headwall 2. Shoulder box 3. Median headwall 4. Median box	Outlet 1. Clean 2. Partly covered 3. Covered 4. Plugged	Cover Material 1. Gravel 2. Dirt 3. Vegetation 4. Concrete	Screen 1. None 2. Open 3. Partly open 4. Blocked	Silt 1. None 2. Slight 3. Moderate 4. Severe	Flow 1. Yes 2. No	Drainage 1. Good 2. Poor 12. Fair	Outlet Pipe 1. Rigid 2. Flexible	A 1. Sag 2. Sag with standing water 3. Sag with siltation 4. Compressed coupling 5. Compressed pipe	B	C	D 6. Backfill in pipe 7. Seperation at coupling 8. Rip in pipe 9. Pipe twisted 10. Mainline blocking outlet at modified "T"	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments

NOTE: Any numeric value, excluding distances and Stations, which has more than one digit means that more than one condition is applicable; i.e., for outlet pipe condition, a numeric value of 45 represents a compressed coupling and a compressed pipe.

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

			HEADWALL CONDITION							OUTLET PIPE CONDITION								
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	A	B	C	D	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments
1514+50	N	1	1		2	1	2	1	2	5						1		
1523+00	N	1	1		2	1	2	1	2	245			2			1		
1533+50	N	1	1		2	1	1	1	2				2			1		
1535+50	N	1	2	2	2	2	1	2	2	2						1		
1540+50	N	1	1		2	1	1	1	2				2			1		
1550+00	N	1	1		2	1	2	1	2							1		
1554+00	N	1	1		2	1	1	2	2	2		2	2			1		
1559+00	N	1	1		2	1	1	1	2	2						1		
1568+00	N	1	1		2	1	2	1	2		NEST					1		
1571+50	N	1	1		2	1	2	1	2							1		
1579+00	N	1	2	2	2	1	1	1	2	2	2	2				1		
1576+50	N	1	1		2	1	2	1	2	4						1		
1594+50	N	1	3	12	3	4	2	2	2							1		
1603+00	N	1	1		2	1	2	1	2							1		
1608+00	N	1	1		2	1	2	12	2							1		
1611+50	N	1	1		2	1	2	12	2							1		Connector crushed and some backfill in pipe, got camera past it.
1620+00	N	1	1		2	1	2	1	2		467					1		Odd looking connector at panel (T).
1616+50	N	1	1		2	1	2	1	2							1		
1624+50	N	1	1		2	1	2	1	2							1		
1642+00	N	1	1		2	1	2	1	2							1		
1645+00	N	1	2	3	3	GRASS	2	1	2							1		Full of ants.
1653+00	N	1	1		2	1	2	2	2							1		
1660+00	N	1	1		2	1	2	12	2							1		
1670+00	N	1	1		2	1	2	1	2							1		
1677+00	N	1	1		2	1	2	1	2							1		
1674+50	N	1	1		2	1	2	1	2							1		
1694+00	N	1	1		2	1	2	1	2				NEST			1		
1696+00	N	1	1		2	1	2	1	2							1		
1691+50	N	1	1		2	1	2	1	2							1		
1708+00	N	1	1		2	1	2	1	2							1		
	N	1	1		3	1	2	2	2				NEST			1		
1709+00	N	1	1		2	1	2	1	2		DEBRIS					1		
1711+50	N	1	1		2	1	1	1	2							1		
1714+50	N	1	1		2	1	2	1	2							1		
1718+50	N	1	1		2	1	2	12	2							1		
1728+50	N	1	1		2	1	2	1	2				NEST			1		
1749+00	N	1	1		2	1	2	1	2	2						1		
1759+50	N	1	1		2	1	2	2	2							1		
1768+50	N	1	2	1	2	1	2	2	2							1		
1772+50	N	1	1		2	1	2	2	2	2	4					1		
1781+50	N	1	1		2	1	2	2	2			NEST				1		
1790+50	N	1	1		2	1	1	1	2							1		
1806+00	N	1	2	23	2	1	2	1	2							1		
1810+00	N	1	2	23	2	2	1	1	2		2	2				1		
1813+50	N	1	1	2	2	1	2	1	2							1		
1817+50	N	1	2		2	1	1	1	2		STRAW					1		
1840+00	N	1	2	2	2	1	1	1	2		2	2		2		1		
1881+50	N	1	1		2	1	1	1	2							1		
1907+50	N	1	2	2	2	1	1	1	2	4						1		
MP 29.87	S	1	1		2	2	1	1	12				2			1	19	Elbow at 4'
MP 29.9	S	1	1		2	1	2	1	12	14			2			1	21	
1517+00	S	1	2	2	3	1	2	1	2	4						1		
1515+50	S	1	1		2	1	2	1	2							1		
1523+00	S	1	1		2	1	2	1	2	8						1		

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

			HEADWALL CONDITION							OUTLET PIPE CONDITION								
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	A	B	C	D	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments
1528+00	S	1	2	2	2	1	2	1	2	2			2			1		
1540+50	S	1	1		2	1	2	1	2	5						1		
1550+00	S	1	1		2	1	2	1	2							1		
1546+50	S	1	1		2	1	2	1	2	4			2			1		
1568+00	S	1	1		2	1	2	1	2							1		
1571+50	S	1	1		2	1	2	1	2			2				1		
1594+00	S	1	1		2	1	2	1	2							1		
1603+00	S	1	2	12	2	1	2	1	2				2	2		1		Sag at end.
1607+00	S	1	1		2	1	2	1	2							1		Elbow is bent up at end of A.
1610+50	S	1	1		2	1	1	2	2							1		
1611+50	S	1	1		2	1	2	1	2				2			1		
1620+00	S	1	1		3	1	2	1	2							1		
1624+00	S	1	1		3	1	2	2	2							1		
1634+00	S	1	1		2	1	2	2	2							1		
1630+50	S	1	2	12	2	1	2	1	2							1		
1638+00	S	1	1		2	1	2	1	2							1		
1642+00	S	1	1		2	1	2	1	2					67		1		At 22' (edge panel), the pipe is about 50% blocked with debris.
1646+00	S	1	1		2	1	2	1	2							1		
1657+00	S	1	1		2	1	2	2	2				2			1		
1665+00	S	1	1		2	1	2	1	2		2		2			1		
1670+00	S	1	1		2	1	2	1	2							1		
1677+00	S	1	1		2	1	2	1	2				2			1		
1674+50	S	1	1		2	1	2	1	2							1		
1681+00	S	1	2	2	2	2	2	12	2							1		Dirt and rocks in pipe, possibly washed in from outlet.
1686+50	S	1	1		3	1	2	12	2							1		
1696+00	S	1	1		3	1	2	1	2		5					1		Pipe partially crushed at 5'.
1698+00	S	1	1		2	1	2	1	2							1		
1694+50	S	1	1		2	1	2	1	2				2			1		
1700+00	S	1	1		2	1	2	12	2				2			1		
1703+00	S	1	2	2	2	2	1	2	2	2	2					1		
1723+00	S	1	1		2	1	2	1	2							1		
1718+50	S	1	1		2	1	2	1	2							1		
1733+00	S	1	1		2	1	2	2	2							1	21	
1749+00	S	1	2	2	2	1	1	1	2				2			1	22	
1754+00	S	1	1	1	2	1	2	1	2							1	27	
1755+00	S	1	1		2	1	2	1	2							1	20	
1759+50	S	1	3	12	3	2	2	2	2				2			1	20	
1765+00	S	1	1		2	1	2	1	2				2			1	22	
1769+00	S	1	1		2	1	2	1	2							1	20	
1777+00	S	1	1		2	1	2	1	2	2						1	20	Say just behind headwall half full of water.
1772+50	S	1	1	3	2	1	2	1	2				2			1	20	
1775+50	S	1	1		2	1	2	1	2				2			1	19	
1786+00	S	1	1		2	1	1	1	2							1		
1790+00	S	1	1		2	1	1	1	2				2			1		
1802+00	S	1	1		3	3	2	1	2		14					1		Bad joint at 4'.
1805+50	S	1	1		3	3	2	1	2		1		2			1		
1806+50	S	1	2	1	2	1	2	1	2		3					1	20	Can't see past sag, pushed camera 20'.
1816+50	S	1	1		3	3	2	1	2	1	1					1		
1823+00	S	1	1		3	2	2	1	2	1						1	19	
1832+00	S	1	1		3	2	2	1	2		2		2			1		
1837+00	S	1	1		3	2	2	1	2				2			1		Pipe half full of water
1840+50	S	1	1		2	1	2	1	2							1		
1847+00	S	1	1		2	1	1	1	2	45			2			1	16	
1849+50	S	1	1		2	2	2	2	2	24		2	2			1	20	

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

			HEADWALL CONDITION							OUTLET PIPE CONDITION								
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	A	B	C	D	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments
1851+50	S	1	1		2	1	1	1	2	4						1	21	
1866+00	S	1	1		2	1	1	1	2	57			2			1	20	
1873+00	S	1	1		2	1	1	1	2	4						1	18	
1879+00	S	1	1		2	1	1	1	2				2	2		1	19	Panel crimped at coupling.
1876+50	S	1	1		2	1	1	1	2	1			2			1	17	
1881+00	S	1	1		2	1	1	1	2				2	2		1	20	3/4 full of water.
1883+00	S	1	1		2	1	2	1	2				2	2	2	1	20	Full of water.
1888+00	S	1	1		2	1	1	1	2	1			2	3	3	1	21	Full of water.
1890+00	S	1	4	3	4	2	1	1	2				2	2	2	1	20	Grass in pipe.
1882+80	S	1	1		2	1	2	1	2				2			1	19	Full of water.
1896+00	S	1	1		2	1	2	1	2				2	2	2	1	21	Elbow at 5'. Full of water at end.
1901+00	S	1	1		2	2	1	2	2	4			2	2	2	1	21	Pipe is completely full at edge drain connection.
1898+50	S	1	2	3	2	2	1	1	2				2	2	2	1	21	Elbow at 5'. Full of water.
1520+00	N	2				1	2	1	2					2		1		
1525+50	N	2				1	2	1	2							1		
1564+00	N	2				1			2				2			1		
1590+00	N	2			1	1	2	1	2	2	2					1		
1630+00	N	2				1	2	1	2							1		
1638+50	N	2				1	2	1	2							1		
1683+50	N	2				1	1	2	2	2						1		
1732+00	N	2				1	2	1	2							1		
1755+00	N	2				1	2	2	2							1		
1793+50	N	2				1	2	1	2							1		
1797+50	N	2				1	1	1	2							1		
1889+00	N	2				1	1	1	2				2			1		
1892+50	N	2				1	1	1	2							1		
1901+00	N	2				1	2	1	2							1		
1554+00	S	2	1			1	2	1	2				2			1		
1660+00	S	2			1	1	2	1	2		6					1		About 17', pipe is completely filled with grass.
1517+00	N	3	1		2	1	2	2	2							1		
1523+00	N	3	2	12	3	1	1	2	2	2						1		
1525+50	N	3	1		2	1	2	2	2		2					1		
1535+50	N	3	1		2	1	1	2	2							1		
1540+50	N	3	1		2	1	1	2	2	2						1		
1550+00	N	3	1		2	1	2	2	2							1		
1559+00	N	3	2	12	3	1	1	2	2		2					1		
1568+00	N	3	1		2	1	2	2	2	2						1		
1585+50	N	3	1		2	1	1	12	2	2						1		
1620+00	N	3	1		2	1	2	2	2							1		
1665+00	N	3	1		2	1	2	12	2				2			1		
1677+00	N	3	2	2	2	1	1	2	2							1		
1674+50	N	3	1		2	1	1	2	2	2			2			1		
1684+00	N	3	1		3	1	1	2	2							1		
1681+50	N	3	1		2	1	1	2	2		2					1		
1686+50	N	3	1		3	1	2	2	2				2			1		
1694+00	N	3	1		2	1	2	1	2		2					1		
1696+00	N	3	1		3	2	2	1	2							1		
1691+50	N	3	1		2	1	2	12	2							1		
1701+00	N	3	1		3	2	2	1	2					NEST		1		
1703+50	N	3	1		3	1	2	1	2							1		
1709+00	N	3	1		3	2	2	1	2							1		
1711+50	N	3	1		2	1	2	1	2							1		
1739+00	N	3	2	1	2	1	2	12	2					NEST		1		
1749+50	N	3	1		2	1	1	2	2	2						1		

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

			HEADWALL CONDITION							OUTLET PIPE CONDITION								
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	A	B	C	D	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments
1801+50	N	3	1		2	1	2	1	2	2						1		
1808+00	N	3	2	12	2	2	2	12	2	24	2	2	2	2		1		
1805+50	N	3	1		2	1	2	12	2	2						1		
1813+50	N	3	1		2	1	2	12	2							1		
1822+50	N	3	1		2	1	2	2	2							1		
1832+00	N	3	1		3	1	2	1	2	67						1		
1842+00	N	3	1		3	1	2	2	2	2						1		
1844+50	N	3	1		2	1	2	2	2							1		
1849+50	N	3	1		2	1	1	2	2							1		
1861+00	N	3	1		2	1	2	12	2							1		
1879+00	N	3	1		2	1	2	1	2					NEST		1		
1881+00	N	3	1		3	1	2	12	2							1		
1896+00	N	3	1		3	2	2	1	2	4			2	NEST		1		
1898+50	N	3	2	2	3	2	2	12	2		2		2			1		
1906+00	N	3	2	2	2	2	2	2	2	2	2	2	2			1		
1907+50	N	3	1		2	1	2	12	2	2		2	2			1		
1517+00	S	3	1		3	1	2	2	2	2						1		
1514+50	S	3	1		2	1	2	2	2		2					1		
1523+00	S	3	2	12	2	1	1	2	2	2						1		
1525+50	S	3	1		2	1	2	2	2	2						1		
1540+50	S	3	1		3	1	2	2	2							1		
1550+00	S	3	1		2	1	2	2	2	4						1		Coupling compressed slightly, but camera passed.
1568+00	S	3	1		3	1	2	2	2							1		
1656+50	S	3	1		2	1	1	2	2							1		
1665+00	S	3	1		4	1	2	12	2	4						1		Coupling compressed, but camera passed.
1677+00	S	3	1		3	2	2	2	2	7						1		Pipe separated at 5', backfill in pipe.
1674+50	S	3	1		3	1	1	2	2	2						1		
1684+00	S	3	1		3	1	2	2	2							1		
1681+50	S	3	1		2	1	2	2	2	7						1		
1694+00	S	3	1		2	1	2	1	2							1		
1701+00	S	3	1		2	1	2	1	2	4						1		
1703+00	S	3	2	12	2	1	2	1	2	3						1		
1706+50	S	3	1		2	1	2	1	2							1		
1739+00	S	3	2	1	3	2	2	12	2							1		
1749+50	S	3	1		2	1	2	2	2							1		
1801+50	S	3	1		2	1	2	1	2		4					1		
1809+00	S	3	1		2	1	2	12	2		4			4		1		
1805+50	S	3	1		2	1	2	12	2							1		
1813+50	S	3	1		2	1	2	12	2					6		1		
1823+00	S	3	1		2	1	2	2	2					STRAW		1		
1832+00	S	3	1		2	1	2	1	2					STRAW		1		
1842+00	S	3	1		3	1	2	2	2							1		
1839+50	S	3	2	12	2	1	1	2	2		2	2	2			1		
1847+00	S	3	1		2	1	1	2	2							1		
1849+50	S	3	2	12	2	1	1	2	2							1		
1861+00	S	3	1		2	1	2	12	2	4						1		
1898+50	S	3	2	2	3	2	2	12	2	4				NEST		1		
1906+00	S	3	2	2	2	3	2	2	2	67						1		Pipe full of backfill in headwall.
1594+00	N	4	1		1	1	1	1	2		2					1		
1598+50	N	4	1		1	1	1	1	2							1		
1603+00	N	4	1		1	1	1	1	2	2						1		
1607+50	N	4	1		1	RCK/GRVL	2	1	2		2					1		
1611+50	N	4	1		1	1	1	1	2							1		
1616+50	N	4	1		1	1	1	1	2							1		

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

			HEADWALL CONDITION							OUTLET PIPE CONDITION								
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	A	B	C	D	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments
1624+00	N	4	1		1	1	2	1	2							1		
1630+00	N	4	1		1	1	1	1	2							1		
1634+00	N	4	1		1	1	1	1	2							1		
1638+00	N	4	1		1	1	2	1	2							1		
1642+00	N	4	1		1	1	2	1	2		2					1		
1714+00	N	4			1	1	1	1	2					NEST		1		
1723+00	N	4			1	1	2	1	2							1		
1728+50	N	4			1	1	2	1	2							1		
1734+00	N	4			1	1	2	1	2					NEST		1		
1759+50	N	4			1	1	2	1	2							1		
1764+00	N	4			1	1	1	1	2	2	2					1		
1768+00	N	4			1	1	1	1	2							1		
1772+50	N	4			1	1	1	1	2	2						1		
1775+50	N	4			1	1	1	1	2	2						1		
1777+50	N	4			1	1	2	1	2							1		
1781+50	N	4			1	1	2	1	2							1		
1786+00	N	4			1	1	2	1	2				2	2		1		
1790+00	N	4			1	1	2	1	2							1		
1798+00	N	4			1	1	1	1	2	2						1		
1794+50	N	4			1	1	2	1	2							1		
1866+50	N	4			1	1	2	1	2							1		
1871+50	N	4			1	1	2	1	2							1		
1876+50	N	4			1	1	2	1	2							1		
1594+00	S	4	1		1	1	1	1	2	2						1		
1603+00	S	4	1		1	1	1	1	2							1		
1598+50	S	4	1		1	1	1	1	2							1		
1607+50	S	4	1		1	1	1	1	2							1		
1611+50	S	4	1		1	1	1	1	2							1		
1616+50	S	4	1		1	1	1	1	2							1		
1624+00	S	4	1		1	1	2	1	2							1		
1630+00	S	4	1		1	1	1	1	2		2					1		
1634+00	S	4	1		1	1	1	1	2							1		
1638+00	S	4	1		1	1	1	1	2							1		
1642+00	S	4	1		1	1	1	1	2							1		
1714+00	S	4			1	1	2	1	2							1		
1723+00	S	4			1	1	1	1	2				2			1		
1728+50	S	4			1	1	2	1	2							1		
1734+00	S	4			1	1	2	1	2							1		
1759+50	S	4			1	1	2	1	2							1		
1768+00	S	4			1	1	2	1	2					NEST		1		
1772+50	S	4			1	2	2	1	2	4	2	2	2	2		1		
1775+50	S	4			1	1	1	1	2	2						1		
1777+50	S	4			1	1	1	1	2	24						1		
1786+00	S	4			1	1	2	1	2	2						1		
1781+50	S	4			1	1	1	1	2							1		
1790+00	S	4			1	1	2	1	2							1		
1798+00	S	4			1	1	2	1	2	3						1		
1794+50	S	4			1	1	2	1	2	4						1		
1866+50	S	4			1	1	2	1	2	2						1		
1871+50	S	4			1	1	2	1	2							1		
1876+50	S	4			1	1	2	1	2							1		
1543+00	N	1	1		2	1	2	1	2							2		Panel compressed in connector.
1585+50	N	1	3	1	2	1	2	2	2							2		Can't get past first 2', can't see what the problem is.
1598+50	N	1	1		2	1	2	12	2	47						2		Coupling at back of headwall crushed, got camera by it.

EDGE DRAIN PIPES AND OUTLET PIPES ON THE PENNYRILE PARKWAY

			HEADWALL CONDITION							OUTLET PIPE CONDITION								
Station	Direction	Location & Type of Headwall	Outlet	Cover Material	Screen	Silt	Flow	Drainage	Outlet Pipe	A	B	C	D	E	F	Good (1) Questionable (2) Bad (3)	Distance	Comments
1634+00	N	1	2	1	2	1	2	2	2	4						2		Coupling crushed behind headwall, got past with camera.
1665+00	N	1	1		2	1	2	1	2					NEST		2		Nest in pipe at panel connector.
1679+00	N	1	1		2	1	2	1	2	4				NEST		2		Nest in pipe at panel connector.
1689+00	N	1	1		2	1	2	1	2		4		NEST			2		Coupling crushed at about 6', got camera past it.
1686+50	N	1	1		2	1	2	12	2	4			NEST			2		Coupling crushed behind headwall.
1701+00	N	1	1		2	1	2	2	2	4	2					2		Coupling crushed at 2', but camera passed.
1861+00	N	1	2	23	3	2	2	2	2	245	2					2		Pipe and coupling at headwall are crushed, camera did pass.
1866+50	N	1	2	2	3	3	2	2	2	56						2		Rock and mud in outlet pipe, probably washed in from outside, outlet is below level of ditch.
1559+00	S	1	2	12	2	3	2	2	2	46						2		
1564+00	S	1	2	3	2	1	2	12	2		46		2			2		Coupling (A–B) crushed. Back behind it.
1578+00	S	1	1		2	1	2	1	2			2				2		At the coupling (C). There is much silt.
1585+50	S	1	1		3	1	2	2	2	45						2		Pipe buckled at coupling.
1616+50	S	1	1		2	1	2	1	2							2		Coupling doesn't look right.
1689+00	S	1	1		2	1	2	1	2	46			2			2		Coulping compressed at 5' into pipe.
1691+00	S	1	1		2	1	2	2	2	4						2		Coupling compressed at 3' into pipe.
1709+00	S	1	1		2	1	2	1	2		5					2		Pipe collapsed about 20–30 % at 5'.
1706+50	S	1	1		1	1	2	1	2	5						2		Pipe partially bent in at coupling at 3'.
1714+00	S	1	1		2	2	2	1	2		5					2		Panel connector looks odd.
1781+50	S	1	1		2	2	1	1	2	1			6			2		Backfill in pipe through D. Can't distinguish why it is there.
1599+00	S	2			1	2	2	1	2	46						2		Rock in pipe at enbow. Can't get camera past.
1797+50	S	2	1		1	1	2	1	2		4					2		Coupling 40% compressed at approx. 12'.
1530+00	N	3	2	2	2	1	1	2	2					6		2		At panel connector, pipe is half full of backfill, no separation is visible, but probably is one.
1576+50	N	3	1		2	1	2	12	2	26						2		Backfill and water standing in pipe at 2'.
1653+00	N	3	1		4	1	2	2	2							2		Pipe mostly blocked by debris, camera went all the way to panel, but debris is against panel.
1903+50	N	3	1		4	3	2	12	2							2		Pipe 1/3 full of muck.
1709+00	S	3	1		3	2	2	1	2	45	45			NEST		2		Pipe is crushed behind headwall, got camera past, nest at panel.
1818+00	S	3	1		2	1	2	1	2							2		
1844+50	S	3	1		2	1	1	2	2	2						2		
1881+00	S	3	1		2	1	2	12	2	47						2		Possible separation at back of headwall.
1517+00	N	1	2	2	2	3	2	1	2	45						3		Behind headwall.
1528+00	N	1	1		2	1	1	1	2	24						3		Can't get camera past A–B coupling, looks crushed, but cannot see for water.
1681+50	N	1	1		2	1	2	2	2	7						3		Separated at back of headwall, can't get camera past it.
1698+00	N	1	1		2	1	2	1	2	46						3		Coupling crushed at 2', looks like separated also with backfill.
1723+00	N	1	1		2	1	2	1	2		4					3		Coupling crushed at 6', camera would not pass it.
1739+00	N	1	2	1	2	1	2	12	2	4						3		Coupling crushed at back of headwall, camera did pass.
1763+50	N	1	1		2	1	2	2	2	6	6					3		Pipe full of backfill, don't know why.
1778+50	N	1	1		2	1	2	2	2		4					3		Pipe closed at 5'.
1784+50	N	1	1		2	1	2	2	2	4						3		Pipe crushed at back of headwall.
1801+50	N	1	1		2	1	1	2	2	45	DEBRIS					3		Pipe in headwall and coupling crushed, camera would not pass.
1822+50	N	1	1		2	1	2	1	2		67					3		Can't get past with camera (5').
1827+50	N	1	1		2	1	2	1	2		4					3		Coupling crushed at headwall (5').
1832+50	N	1	1		2	1	2	1	2		4					3		Coupling crushed at headwall (5').
1842+00	N	1	2	23	3	3	2	2	2	4	4					3		Crushed at headwall.
1844+00	N	1	1		2	1	2	12	2	7						3		Separated at headwall.
1852+00	N	1	1		2	1	1	1	2	246						3		Crushed at headwall.
1847+50	N	1	1		3	2	2	1	2	4						3		Crushed at headwall.
1849+50	N	1	1		2	1	1	1	2	4						3		Crushed at headwall.
1871+50	N	1	1		2	1	2	12	2	5						3		Crushed at headwall.
1879+00	N	1	1		3	4	2	1	2	46						3		Pipe crushed at headwall.
1876+50	N	1	1		3	1	2	1	2	4	45					3		Pipe crushed behind headwall.

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1884+00	N	1	1		3	2	2	1	2	67						3		
1886+50	N	1	2	2	2	2	2	1	2	67						3		
1890+50	N	1	1		3	2	1	12	2	467						3		Pipe is crushed and has alot of mud in it behind headwall.
1898+50	N	1	1		3	3	2	2	2	6	47					3		Couupling crushed, pipe is full of rock.
1903+50	N	1	1		4	2	2	1	2	467	4	45				3		
1906+50	N	1	2	2	3	3	2	2	2	24	4					3		
MP 29.84	S	1	1		2	2	1	1	2	6						3	2	Full of rock at 2'
1520+00	S	1	1		2	1	2	1	2	67						3		Behind headwall.
1525+50	S	1	1		2	1	2	1	2	67						3		Behind headwall.
1532+00	S	1	1		2	1	2	2	2			6				3		Y connector at 15', full of backfill on one side.
1536+50	S	1	1		3	1	2	12	2	67						3		Pipe uncoupled and full of backfill.
1679+50	S	1	2		1	1	2	1	2					7		3		Coupling came loose at 17'. Pipe is full of rock.
1711+50	S	1	1		2	1	2	12	2	46						3		Coupling compressed at about 3', allowing backfill into pipe.
1728+50	S	1	1		2	1	2	1	2		4					3		Coupling compressed at 6'.
1739+00	S	1	1		2	1	2	2	2	7						3		Coupling seperated at about 2'.
1794+50	S	1	1		1	1	2	1	2		678					3		Open to panel, but rip or separation at 5', and rock in pipe.
1810+00	S	1	1		2	1	1	1	2	47						3		Coupling buckled in, can't get camera past.
1813+50	S	1	1		2	1	2	1	2	6	67					3		Rip or separation at 4'.
1818+00	S	1	1		2	1	1	1	2	6						3	2	Pipe full of rock at about 2'.
1828+00	S	1	1		2	1	2	2	2							3		Blocked at 4'. Can't see problem. Garden hose would not pass.
1844+50	S	1	1		2	1	1	1	2							3		Coupling on backside of headwall compressed pipe approx. 50% open.
1858+50	S	1	2	2	2	2	1	2	2							3		Separated at 2'
1684+00	S	2			1	1	2	1	2		67					3		Pipe completely full of dibris at 9'.
1514+50	N	3	1		2	1	1	2	2	4						3		Pipe was crushed on both sides of coupling.
1839+50	N	3	2	2	2	1	1	2	2	7						3		Pipe separated behind headwall.
1852+00	N	3	1		2	1	2	2	2	27						3		
1530+00	S	3	1		2	1	2	2	2	5						3		Pipe is crushed at 2', comera will not pass.
1535+50	S	3	1		2	1	2	2	2	4						3		Pipe or coupling compressed at 3', comera would not pass.
1559+00	S	3	1		2	1	1	2	2	6						3		
1576+50	S	3	1		2	1	2	12	2	6						3		Pipe almost full of gravel at 2--3'. Pushed it to 4' but stopped there.
1585+50	S	3	1		3	1	2	12	2	4						3		Pipe compressed at back of headwall, camera would not pass.
1620+00	S	3	1		3	1	2	2	2	4						3		Camera would not pass.
1686+50	S	3	2	23	2	1	1	2	2	7						3		Pipe separated at about 4', backfill in pipe.
1691+50	S	3	1		3	3	2	12	2	67						3		2--3' into pipe.
1696+00	S	3	1		3	4	2	1	2	67						3		
1711+50	S	3	1		3	2	2	1	2	67						3		
1810+00	S	3	1		2	1	2	1	2	67						3		
1816+50	S	3	1		2	1	2	12	2	67						3		Pipe separated behind headwall.
1852+00	S	3	1		2	1	2	2	2	4						3		Can't get past with camera.
1879+00	S	3	2	12	3	2	2	1	2	467						3		
1896+00	S	3	2	2	2	3	2	1	2	67						3		Pipe full of backfill in headwall.
1903+50	S	3	1		2	1	2	12	2	67						3		Pipe full of backfill in headwall.
1907+50	S	3	1		3	2	2	12	2							3		Pipe blocked.
1764+00	S	4			1	1	2	1	2	7						3		